

# *Red Line/Blue Line Connector Project*

Boston,  
Massachusetts

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Massachusetts Department of Transportation  
Boston, Massachusetts



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# 1

## Introduction

This Technical Memorandum outlines each phase of construction, the potential temporary impacts on traffic, and the traffic management plan proposed to mitigate these impacts. These are additional impacts that were not described in other submitted Technical Memorandums and Reports. Construction phasing activities for the Project, all of which are common between the two Build Alternatives, are summarized in Chapter 2. Chapter 3 describes potential impacts during construction, and Chapter 4 includes the proposed Traffic Management Plan.

These temporary traffic impact evaluations respond to the requirements of the Massachusetts Executive Office of Energy and Environmental Affairs Secretary's Certificate on the Expanded Environmental Notification Form (EENF) and consider the comment letters received on the EENF. The analyses were developed in compliance with the Massachusetts Environmental Policy Act (MEPA) regulations.

The proposed tunnels for the Blue Line extension under Cambridge Street, west of the existing Bowdoin Station, would be constructed by a horizontal tunnel boring machine (TBM). This machine would bore the two (in-bound and out-bound) tunnels beneath existing infrastructure. All work along this segment would be completed below grade, with the exception of open excavation access points at either end of the tunnel alignments. Surface disturbance on Cambridge Street would be limited. East of Bowdoin Station, for approximately 550 feet, cut-and-cover construction would be used to realign the existing tracks from Government Station. Open excavation would also be used to construct the vent shaft in the vicinity of North Anderson Street. The open excavation areas would total approximately 86 linear feet in addition to the TBM starting and receiving holes. The open trenches would be covered with traffic decking, when possible.

A staging area, tentatively established as a portion of the Massachusetts Eye and Ear Infirmary (MEEI) parking lot immediately northwest of Charles/MGH Station, would be the main access point to the excavation area. A second access point would be established near Bowdoin Station to allow the TBM to be removed.

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# 2

## Construction Phasing

A general Construction Phasing Plan has been developed for the Project. The Construction Phasing Plan identifies the general phases, tasks, and construction methodologies. In chronological order (with some task overlap), the major phases of construction would include:

- Phase 1 - Initial utility relocation and other initial activities including installation of a reverse crossover in the tracks east of Government Center Station and necessary track signal modifications;
- Phase 2 - Northerly (westbound) tunnel construction and excavation of the cut-and-cover tunnel east of Bowdoin Station;
- Phase 3 - Southerly (eastbound) tunnel construction;
- Phase 4 - Construction of station(s), center arch (combining the two tunnel borings into one wider tunnel), platform, and the crossover area east of Charles/MGH Station;
- Phase 5 - Systems installation; and
- Phase 6 - Testing and close out.

The anticipated duration of constructing the Preferred Alternative is 6 years and 3 months. The Project would be completed by the end of the third quarter of 2018, assuming a starting time at the beginning of the third quarter of 2012. A detailed construction Phasing Plan will be completed as part of final design, by December 31, 2011.

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# 3

## Temporary Traffic Impacts

The following sections outline the proposed traffic management strategy for construction of the project. The proposed traffic management plan is the same for Alternative 1 and Alternative 2. The difference in construction of the two alternatives takes place below the street level, except for the ventilation and emergency egress structures for the relocated Bowdoin Station in Alternative 2, and has no impact on transportation infrastructure.

Construction impacts typically consist of temporary road and sidewalk closures and detours, which are expected to terminate upon project completion. Transportation impacts would include short-term impacts to traffic/pedestrian circulation and parking during construction. The use of roadway detours, moving construction equipment and the provision of work zones, and support of excavation (SOE) methods would be limited to nights and weekends. Existing station access to Charles/MGH Station would be maintained throughout construction. While Bowdoin Station would be closed during the majority of construction (either permanently or for reconstruction) there may be a need to provide access during early stages of construction via temporary sidewalks connecting to the existing headhouse. Impacts interior to the station are discussed in the *Construction Impacts Technical Report*. A detailed discussion of construction staging is provided below, along with suggestions for mitigation of construction impacts to traffic and pedestrians.

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### 3.1 Roadway Impacts

There would be no impacts to the number of travel lanes provided along Cambridge Street during construction. All lanes would remain open during the day (excavation areas will be decked over). Travel lanes would generally be 11 feet wide, with some turning lanes striped to 10 feet. Isolated impacts to intersection lane geometry would occur, which are discussed in Section 3.1.3.

### 3.1.1 Parking

Approximately eighty-nine parking spaces along Cambridge Street would be impacted at some point during construction. All but five of these spaces would only be impacted on a temporary basis. Table 3-1 presents the type, duration, and location of the parking impacts. The duration of impact would be further refined as the design for the Project progresses.

For the duration of construction, the existing Massachusetts Eye and Ear Infirmary (MEEI) parking lot on Charles Street (under the Storrow Drive ramps) would be used as a construction staging area. To accommodate MEEI patients and visitors who use this parking lot, a temporary multi-story parking structure would be constructed on the unused portion of the lot.

**Table 3-1 Construction-Related Parking Impacts**

Location	Duration	Type	Associated with
Cambridge Street Westbound near Charles Circle	Duration of construction	5 meter	Mobilization/Staging, utility relocation, subsurface grouting and decking support construction
Cambridge Street Eastbound near Charles Circle	Construction Phase	4 meter 2 commercial	Mobilization/Staging, utility relocation, subsurface grouting and decking support construction
Cambridge Street Eastbound near North Anderson Street	Construction Phase	9 meter 1 loading zone	Vent room & egress hatch construction
Cambridge Street Westbound near North Anderson Street	Construction Phase	3 meter	Vent room & egress hatch construction
Cambridge Street Eastbound between Blossom Street and Hancock Street	Construction Phase	1 commercial	Median element construction
Cambridge Street Westbound between Hancock Street and Blossom Street	Construction Phase	7 meter	Median element construction
Cambridge Street Eastbound between Bowdoin Street and Court Street	Construction Phase	3 loading zone 21 meter 10 unrestricted	Slurry wall/utility relocation and decking construction
Cambridge Street Westbound between Bowdoin Street and Court Street	Construction Phase	14 meter 9 handicapped <sup>1</sup>	Slurry wall/utility relocation and decking construction

<sup>1</sup> An additional six handicapped parking spaces would be temporarily relocated from Cambridge Street to New Chardon Street.

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### 3.1.2 Traffic Volumes

Disruptions to traffic that would be caused by construction of the proposed project are limited to night and weekend detours of portions of Cambridge Street. These detours are discussed in Chapter 4. Generally, Cambridge Street westbound traffic would be detoured to Leverett Circle via Staniford Street and Lomasney Way and eastbound traffic would be detoured to Blossom Street via Charles Street. Local access to streets and uses along Cambridge Street would be permitted under police control. The potential for traffic impacts in neighborhoods adjacent to Cambridge would be substantially reduced because detours would be limited to nights and weekends and through traffic would not be permitted into the study area during these times.

Traffic data collected during the overnight hours indicate that approximately 1,500 vehicles travel along Cambridge Street between the hours of 11:00 PM and 5:00 AM, the timeframe detours would be in place. The busiest of those hours is from 11:00 PM to 12:00 AM when 550 vehicles were observed. More than half of these vehicles travel in the westbound direction. This represents the maximum number of vehicles that have the potential to be detoured during construction.

At this phase of design (approximately 10 percent) it is not possible to determine the actual hours the detours would be in place or the duration of the detours. As design progresses, continuous modifications to the Traffic Management Plan would be required to incorporate the latest information.

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### 3.1.3 Traffic Operations and Levels of Service

During construction, the geometry and/or signal timings at five intersections would be altered:

- Charles Circle – Charles Street/Storrow Drive Westbound Off-ramp;
- Cambridge Street at Joy Street;
- Cambridge Street at Staniford /Temple Street;
- Cambridge Street at New Chardon/Bowdoin Street; and
- Cambridge Street at New Sudbury/Somerset Street.

Anticipated changes to intersection level of service due to these construction modifications would be small (less than 10 seconds of additional delay), and isolated to particular movements at the intersections. The level of service analyses for the construction modifications are provided in the appendix.

Modifications at Charles Circle would be in effect throughout the entire construction period and would include a reduction in the number of lanes provided in the northbound direction (under the Charles/MGH Station) from six lanes to three lanes.

Minor signal modifications would be implemented at the intersection of Cambridge and Joy Streets during certain phases of construction. The crosswalk on the east side of this intersection would be moved east approximately 35 feet. The clearance times (yellow and red signal indications) would be increased to accommodate this shift. The overall signal operations would not change and therefore, no change in level of service is expected.

The traffic signal cycle length at the intersection of Cambridge and Staniford/Temple Streets would be modified during the morning peak hours so that this intersection can remain part of a coordinated signal system with New Chardon and New Sudbury Streets. This intersection would not see degradation in level of service due to this change. No other changes are proposed.

The Cambridge Street intersections at New Chardon/Bowdoin Street and New Sudbury/Somerset Street would be altered for a large portion of the construction period. During this phase of construction, Cambridge Street would be reduced to two travel lanes plus a turning lane in both directions of travel between New Chardon Street and Court Street. Signal timing and phasing adjustments at the intersections of Cambridge Street and New Chardon/Bowdoin Street and Cambridge Street at New Sudbury/Somerset Street would be modified to accommodate this temporary traffic condition. Overall existing levels of service would be maintained at these intersections; however, some movements would experience an increase in delay due to construction. Traffic control would be managed through the use of police detail when necessary.

Other temporary lane closures and detours would be required on occasion to facilitate moving equipment into and out of work zones and to support other construction measures. These lane closures and detours would occur at night and on weekends and are expected to have a limited impact on off-peak traffic operations. At nights and on weekends, New Sudbury Street would be temporarily closed at its intersection with Cambridge Street. Access to New Sudbury Street would be maintained from Congress Street.

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## 3.2 Pedestrians and Bicycles

The traffic management plan includes the maintenance of pedestrian and bicycle accommodations along the Cambridge Street corridor. There is one location where minor impacts to pedestrian accommodations would be unavoidable.

At the intersection of Cambridge and Joy Streets, the pedestrian crosswalk across Cambridge Street would be moved to the east about 35 feet during a portion of construction. The current pedestrian signal crossing and traffic control would be maintained and the delay to pedestrians waiting to cross the street would not

change. For pedestrians heading to/from Charles River Plaza from Joy Street, the walk trip would increase by less than 10 seconds.

Minor signal timing adjustments at Staniford/Temple Street and New Chardon/Bowdoin Street would be needed throughout the duration of construction. These minor timing changes have a negligible effect on pedestrian levels of service at the intersection crosswalks.

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### 3.3 Emergency Access and Truck Routes

Emergency access will be maintained at all times throughout the area. Temporary disruptions to emergency vehicles, the Partners Shuttle, and truck routes might occur during the closure and detour of Cambridge and Sudbury Streets on nights and weekends over the course of the project. At this stage of design, emergency access to the MGH/MEEI area when Cambridge Street westbound is closed would be via the closed section of Cambridge Street (emergency vehicles will be allowed access by police) to North Grove Street. When Cambridge Street eastbound is closed, access would be provided either from Charles Street, Blossom Street, and Parkman Street or via Revere Street to Garden Street, depending on which direction the emergency vehicle is coming from.

Access for the fire station would not be affected unless the unit is requested to assist the Cambridge Fire Department. If it is necessary for the fire unit to respond to an emergency in Cambridge while Cambridge Street westbound is closed, access would be provided via Lomansey Way and the Craigie (Charles River Dam) Bridge. Access to Cambridge, Storrow Drive, and Leverett Circle will also be available from the Cambridge Street fire house via Blossom Street to Charles Street.

As the design for the project develops and construction areas and associated detours are specifically defined, additional information on emergency access would be available. Close coordination with emergency response officials and area hospitals would be ongoing throughout design and construction to ensure all emergency responders have unimpeded access as needed.

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### 3.4 Transit Operations

As discussed above, changes to lane geometry at intersections would have a negligible impact to levels of service in the study area. No reduction in roadway cross-section along Cambridge Street is anticipated during peak hours and necessary road closures would occur during nights (mostly after MBTA service hours) and weekends. There are no existing or planned MBTA bus routes on Cambridge Street therefore no impacts are anticipated.

The traffic detours would cause small modifications to some Partners Shuttle routes during nights and weekends. The rerouting would not increase travel time for passengers.

# 4

## Traffic Management Plan

This Chapter summarizes the expected construction impacts on transportation and the Traffic Management Plan established in support of the conceptual design. At this stage of design, the plan maintains four lanes of traffic on Cambridge Street; maintains pedestrian access to businesses and transit; limits the removal of parking and loading zones; provides full and efficient access for emergency vehicles; and discourages cut-through traffic on surrounding neighborhood streets.

The Traffic Management Plan is still fairly general in nature at this stage of design and as the project design progresses, specific details related to time periods, number of days expected, and traffic volumes would be developed.

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### 4.1 Mobilization/Staging Area, Utility Relocation, Subsurface Grouting & Decking Support Construction

The initial phase of construction for Alternatives 1 and 2 starts with the relocation of utilities, subsurface jet grouting from the surface to stabilize soil conditions, and installation of the vertical traffic decking supports. This would also include establishing a construction staging area on the MEEI parking lot located between Storrow Drive eastbound and Charles Street. This staging area would comprise the area of land currently located between Storrow Drive eastbound and the north side base of the Longfellow Bridge. Initial work within this staging area would include relocating the existing driveway entrance further north to construct a vertical shaft or “glory hole” within the footprint of the existing entrance driveway. The glory hole would extend down to track elevation at the westernmost terminus of the northern tail track to be constructed as part of this project. The glory hole would serve as the main connector to support tunnel construction for the entire western end of the project (areas west of New Chardon Street). All materials necessary for the construction of the tunnel structure, Tunnel Boring Machine (TBM), and excavation of the tunnels and station area would be serviced from this location.

Truck routes to and from the project areas are as defined on Figure 4-1. Charles Street north of Cambridge Street, Cambridge Street, and Lomasney Way are identified as truck routes in support of construction. While the work to construct the glory hole would be completed outside of the public way, the work to relocate the entrance driveway, modify existing traffic alignments, complete necessary utility relocations, install vertical traffic decking supports, and subsurface grouting work would all take place within the public way and temporary lane closures and detours would be necessary. This work is planned to be completed during off-peak traffic hours as defined by the Boston Transportation Department. These hours are typically 9:30 AM to 3:30 PM and 7:00 PM to 5:30 AM Monday through Friday with weekend work and detours occurring between the hours of 7:00 PM on Friday evening and 5:30 AM on Monday morning. Full-time moving work areas along the parking lanes, sidewalks and in the existing medians would also be used as necessary and as space allows within the Right-of-Way (ROW). Use of these full-time work areas and temporary lane closures and detours would have a localized affect on pedestrian routes, curbside parking and possibly roadway alignments depending on the size and location of the utility or vertical traffic decking support to be constructed. The exact nature and extent of these impacts would be identified during final design of the proposed project.

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## 4.2 Red Line Support, Support of Excavation (SOE), Vent Room Construction

Once the utility relocations have been completed, the existing Red Line supports at Piers 6 and 7 along Cambridge Street eastbound would be underpinned. To support this work, the existing Cambridge Street roadway would be realigned to the north as much as possible between these two supports to establish a work area around Pier 7 which is located on the southeastern side of Cambridge Street eastbound (see Figure 4-2). The work area would comprise part of the existing private parking lot located beneath the Red Line tracks east of Pier 7. This area is necessary to construct the underpinning system for Pier 7 and vertical traffic decking support elements and to accommodate the relocated pedestrian walkway around the work area during this phase of construction.

Cambridge Street eastbound would remain a two-lane roadway widening to a three-lane roadway as it approaches North Grove Street (as it exists today). Cambridge Street westbound would be realigned to the north into the existing parking lane (to the west of Cambridge Street Avenue) with a two-lane section replacing the current three lane section as it approaches the existing traffic signal at Charles Street. Access would be maintained to/from West Cedar Street, Lindall Place and the parking lot driveway adjacent to the proposed work area at all times.



The realignment of Cambridge Street would also include temporary modifications within Charles Circle. The easternmost roadway beneath the Charles/MGH Station accessing Charles Street would be closed and traffic shifted to the center roadway beneath the station that currently provides access only to Storrow Drive westbound and the MEEI parking area. This would require modifications to the existing traffic signal and median island separating the Storrow Drive westbound on-ramp from Charles Street to accommodate the movement to Charles Street from this location. This change would also require a modification to the existing median between the Longfellow Bridge eastbound and the Storrow Drive westbound off-ramp providing access to Charles Circle. The closed roadway within Charles Circle would be used as a staging area to support the station modification work necessary to incorporate the new Blue Line station below grade into the existing elevated Red Line station.

As shown on Figure 4-3, to support construction east of New Chardon Street, Cambridge Street would be realigned to the south between New Chardon and Court Streets to establish full-time work zones on the north side of Cambridge Street. This is to support the modifications necessary to the existing Bowdoin Station, utility relocation, vertical traffic decking support installation, and installation of an earth retention system to support excavation (SOE) for the cut and cover construction section of the project. The realigned roadway would consist of two general purpose lanes in each direction of travel with additional exclusive left-turn lanes for the intersecting side streets at both New Sudbury and Somerset Streets. Parking would be maintained on both sides of the alignment with limited temporary prohibitions to support ongoing construction.

Once the utility relocation, vertical traffic decking support installation and earth retention systems are completed, Cambridge Street would be realigned to the north between New Chardon and Court Streets to establish full-time work zones on the south and center portions of Cambridge Street, as shown on Figure 4-4. This is to support utility relocation, vertical traffic decking support installation, and installation of an earth retention system to support excavation (SOE) for the remainder of the cut and cover construction section of the project. The realigned roadway would consist of two general purpose lanes in each direction of travel with additional exclusive left-turn lanes for the intersecting side streets at both New Sudbury and Somerset Streets. Parking would be restricted on both sides of the alignment for the duration of work through this area.

Once the construction in the area of Pier 7 is complete, Cambridge Street eastbound would be realigned to the south between Charles Street southbound and Lindall Place to establish a larger work area adjacent to the Charles/MGH station for the underpinning, demolition and reconstruction of Pier 6, and other associated work (Figure 4-5). The new alignment would remain a two-lane roadway widening to a three-lane roadway as it approaches North Grove. This traffic pattern change would affect only Cambridge Street eastbound and maintains the previously established alignments within Charles Circle and along Cambridge Street westbound. This long

term work area and roadway alignment would remain in place until the beginning of surface restoration in the final phases of construction.

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### 4.3 Traffic Decking

Figure 4-6 shows the proposed detours associated with installing of traffic decking. As the installation of the vertical traffic decking supports advances, traffic decking excavation and installation would begin. In order to facilitate this work, Cambridge Street would be closed and detoured in certain locations and temporarily realigned in others. Traffic decking across the Charles/MGH section of Cambridge Street would be completed in two sections (north and south sections) due to utility relocations necessary to complete this work.

The first or north section of traffic decking to be installed would require closing and detouring Cambridge Street westbound. This is necessary to excavate the existing roadway and subgrade material and install the horizontal decking supports and traffic decking system in sections. This work is planned to be completed utilizing weekend detours. Cambridge Street eastbound would remain open to traffic with Cambridge Street westbound closed to general traffic at Staniford Street. Where Cambridge Street would be closed, local access to abutting properties and the medical facility area would be allowed via North Grove Street. The detour for general traffic would be:

- Right-turn (north) to Staniford Street;
- Left to Lomasney Way (which becomes Nashua Street) with access to Leverett Circle;
- From Leverett Circle, traffic destined for Charles Circle and Cambridge would be directed right onto O'Brien Highway and then left onto Land Boulevard;
- Traffic destined for Charles Circle would then be directed eastbound across the Longfellow Bridge back to Charles Circle; and
- Traffic destined for Cambridge would be directed to Broadway in Cambridge via Land Boulevard.

Traffic decking installation for the south section across Cambridge Street eastbound would be completed in the same manner. Cambridge Street westbound would remain open to traffic and Cambridge Street eastbound would be closed to all traffic at Charles Circle. The detour for general traffic would be:

- Charles Circle to Charles Street northbound;
- Right-turn onto Blossom Street; and
- Blossom Street back to Cambridge Street.

Access to Lindall Place would be maintained using police control on the closed section of Cambridge Street. The section of West Cedar Street north of Phillips Street would be closed except for local access.

Traffic decking would also be installed over the cut and cover section east of New Chardon Street. Installing decking through this area would require implementing a unique traffic pattern that would maintain two-way traffic with limited parking with traffic being temporarily rerouted around the areas to be installed within Cambridge Street. This work would take place during off-peak traffic hours at night and on weekends to limit disruption.

There would also be a need to temporarily close and detour New Sudbury Street traffic to New Chardon Street to support the construction through this area also during off-peak traffic hours at night and on weekends. Local access to New Sudbury Street would be maintained from Congress Street under police control. Once the traffic decking installation is completed, the traveled way would be realigned between New Chardon and New Sudbury Streets to provide a center work area to advance the tunnel construction work below the traffic decking.

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#### 4.4 Tunnel Boring Machine (TBM) Installation/Extraction

The installation of traffic decking allows for construction to continue below grade without disrupting traffic above. However, Cambridge Street traffic in the Charles/MGH area would be closed and detoured for two additional weekends to temporarily remove the traffic decking and install and assemble the TBM and reinstall the traffic decking to excavate the north and then the south tunnels of the new Blue Line connector. The area of impact would be the same as it was for the traffic decking installation and therefore the local access and detours would also be the same as shown on Figure 4-6.

The same process would take place where the TBM terminates its excavation work in the New Chardon Street Area for both the north and south tunnels. The implementation of a unique traffic pattern, maintaining two-way traffic with one lane for each direction of travel, would be necessary over a weekend period to temporarily remove the traffic decking, disassemble and remove the TBM and reinstall the traffic decking. Access would be maintained to/from Bowdoin, New Chardon and New Sudbury Street at all times for this element of the work.

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#### 4.5 Median Element Construction

The final stages of construction, prior to final surface street restoration, would involve the construction of elements in two areas of the project corridor within the

existing median islands along Cambridge Street. To construct these elements, traffic would be realigned to provide a work area along or staged across the existing median. The first area is located between North Grove and North Anderson Streets to construct an emergency egress walkway and hatch from the new Blue Line station platform up to the roadway surface, and a ventilation fan room between the crown of the new tunnels and the surface. To accomplish this, curbside parking restrictions and curb modifications on Cambridge Street eastbound and westbound between North Grove and Blossom Streets as well as modifications to the existing signal phasing and timing at the intersection of Cambridge and Blossom Streets would be necessary. This staged construction will also require the temporary removal of existing Cambridge Street eastbound left turn lane approaching Blossom Street for the duration of this work as shown on Figures 4-8, 4-9 and 4-10.

The second area would be located at Joy Street in the vicinity of the West End Branch of the Boston Public Library and the Beacon Hill/West End Firehouse. The second area would only be required for the construction of Alternative 2. As shown on Figure 4-11, establishing this median work area would require curb line modifications, parking restrictions and pedestrian/traffic signal modifications on Cambridge Street. The work area as currently planned would not inhibit access to/from the firehouse or any of the adjacent properties at any time. It would require the temporary relocation of the existing Joy Street pedestrian crossing and associated traffic signal equipment approximately 35 feet to the east of its current location for the duration of this work zone.

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## 4.6 Surface Restoration

Cambridge Street would need to be closed and detours would also be necessary a number of times near the end of construction to remove the traffic decking, backfill over the newly completed tunnel structures and begin surface restoration work. Once the removal of the traffic decking and final utility installation has been completed, roadway configurations would return to their respective pre-construction alignments and surface restoration work would be completed using temporary lane closures or detours during off-peak traffic periods to complete the work.

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The Red Line/Blue Line Connector Project complements the regional planning projects in improving infrastructure including transit, pedestrian, and bicycle facilities and services across the lower Charles River. Coordination of MBTA Blue Line service, traffic and pedestrian management as it is related to other construction projects happening concurrently with this Project will require traffic management for the neighboring construction projects which include the following:

- Blue Line Extension to Lynn;
- Urban Ring;
- Longfellow Bridge;
- Craigie Dam Bridge and Drawbridge; and
- Storrow Drive Tunnel.

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# Figures

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